

## CLAIMS

1. A control system for regulating vehicle emissions comprising:
  - a valve that controls recirculation of exhaust gas in an engine;
  - 5 a sensor that communicates with the exhaust gas to measure oxides of nitrogen levels;
  - a controller that communicates with the sensor and the valve, wherein the processor adjusts the valve if the oxides of nitrogen levels are not within a threshold.
2. The control system of claim 1 wherein the threshold is determined by a calibration map generated on the controller.
3. The control system of claim 2 wherein the calibration map is a predetermined lookup table.
4. The control system of claim 3 wherein the processor adjusts the valve according to the lookup table.
5. The control system of claim 3 wherein the lookup table determines the threshold based on an accelerator pedal position and an engine speed.
6. The control system of claim 1 wherein the controller diagnoses valve malfunctions based on the oxides of nitrogen levels.
7. The control system of claim 5 wherein the controller diagnoses valve malfunctions if the oxides of nitrogen levels are not within a threshold for a period.

8. The control system of claim 4 wherein the controller diagnoses valve malfunctions if the oxides of nitrogen levels are not within a threshold after the controller adjusts valve performance.

9. A control system for regulating vehicle emissions comprising:

a cam phaser that controls a position of a camshaft, wherein the position affects exhaust gas in an engine;

5 a sensor that communicates with the exhaust gas to measure oxides of nitrogen levels;

a controller that communicates with the sensor and the cam phaser, wherein the processor adjusts the cam phaser if the oxides of nitrogen levels are not within a threshold.

10. The control system of claim 9 wherein the threshold is determined by a calibration map generated by the controller.

11. The control system of claim 10 wherein the calibration map is a predetermined lookup table.

12. The control system of claim 11 wherein the processor adjusts the camphaser according to the lookup table.

13. The control system of claim 11 wherein the lookup table determines the threshold based on an accelerator pedal position and an engine speed.

14. The control system of claim 9 wherein the controller diagnoses cam phaser malfunctions based on the oxides of nitrogen levels.

15. The control system of claim 14 wherein the controller diagnoses cam phaser malfunctions if the oxides of nitrogen levels are not within a threshold for a period.

16. The control system of claim 14 wherein the controller diagnoses cam phaser malfunctions if the oxides of nitrogen levels are not within a threshold after the controller adjusts cam phaser performance.

17. A method for reducing NOx levels in vehicle emissions comprising:

5       measuring NOx levels in exhaust gas in an engine;  
      controlling exhaust gas recirculation in an engine; and  
      communicating the NOx levels to a controller wherein the  
controller adjusts the exhaust gas recirculation in the engine if the NOx  
levels exceed a threshold.

18. The method according to claim 17 further comprising:  
generating a calibration map at the controller; and  
determining a threshold at the calibration map.

19. The method according to claim 17 wherein the controller adjusts the exhaust gas recirculation in the engine if the NOx levels exceed the threshold for a period.

20. The method according to claim 18 wherein the controller adjusts the exhaust gas recirculation according to the calibration map.

21. The method according to claim 20 further comprising  
determining the threshold based on an accelerator pedal position and  
an engine speed.